

REMARKS/ARGUMENTS

Claims 1-73 and 75-87 are pending. Claims 1-66 are withdrawn, and claims 67-73 and 75-87 stand substantively rejected. Reconsideration is respectfully requested.

First 35 U.S.C. §103 Rejection

Claims 67-69, 76, and 79 were rejected under 35 U.S.C. 103(a) as allegedly being obvious over US 6,007,690 ["Nelson"] in view of US 6,408,878 ["Unger"]. This rejection is traversed.

According to MPEP 2143, to support a *prima facie* case of obviousness it is important to identify a reason that would have prompted the artisan to combine elements in the way the presently claimed new invention does. The proposed combination of Nelson and Unger does not meet this test.

Independent Claim 67

Presently pending independent claim 67 is drawn to a method of obtaining nucleic acid from a sample. The method has an isolating step that includes, among other things, allowing the individual biological element or the subset of the biological elements to flow past a first valve of the microfluidic device, creating a segment within the flow channel by actuating the first valve and a second valve of the microfluidic device, and preventing the individual biological element or the subset of the biological elements from exiting the segment past the first valve or the second valve.

Aspects of presently pending claim 67 can be further understood with reference to Fig. 20A of the instant application (partially reproduced below). As depicted here, biological element(s) can flow past valve (7408a). A segment within flow channel (7402) can be created by actuating valves (7408a) and (7408b). Biological element(s) can be prevented from exiting the segment past valve (7408a) or (7408b).

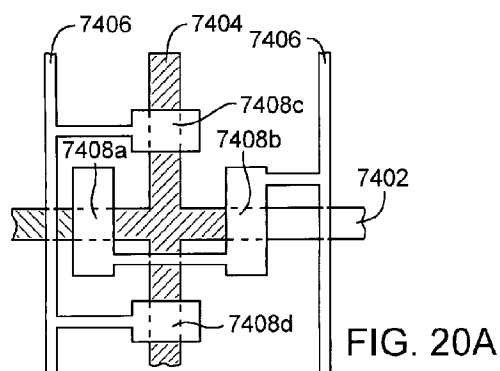


FIG. 20A

Fig. 20A of instant application

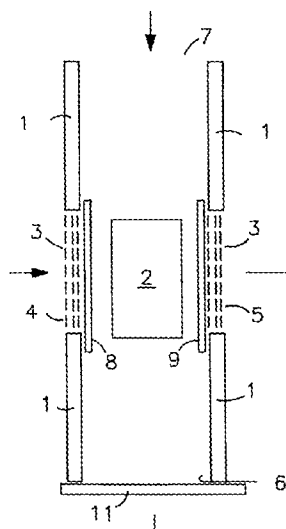


Fig. 1 of Nelson

In contrast, Nelson's method involves an electrophoresis device having an enrichment channel. As explained with reference to Fig. 1 (partially reproduced above) Nelson's sample is introduced into the enrichment channel through inlet (7), and the analyte fraction is retained on the reverse phase material (2). The waste fraction flows out of waste outlet (6). Elution buffer can enter inlet (4) past valve (8), and the retained fraction and elution buffer can exit through outlet (5) past valve (9). See also Nelson at col. 11, line 49 to col. 12, line 5 and col. 14 lines 20-27. Unger describes a microfabricated elastomeric valve.

As stated in the Office Action, Nelson fails to describe allowing biological element(s) to flow past a first valve, and actuating the first valve and a second valve preventing the biological element(s) from exiting that segment of a flow channel.

Applicants submit that the proposed modification to Nelson is without basis, because Nelson requires explicitly defined retention and separation techniques. For example, at

col. 4, lines 43-53, Nelson says that the enrichment medium is **critical** to the electrophoresis device, whereby the target analyte is selectively retained and separated. Accordingly, it is improper to conclude that the artisan seeking sample retention would be prompted to *replace* Nelson's enrichment medium with Unger's valve. Because Nelson discourages and teaches away from removing the enrichment medium, the proposed modification is contrary to the principles of MPEP 2143.01 (I).

Relatedly, Nelson's enrichment technique appears to require the continuous flow of sample moving past the enrichment medium (2), so that waste fraction flows out of waste outlet (6) while analyte is retained on the enrichment medium (2). If Nelson's enrichment medium were replaced with a valve that opens and closes, it is not clear how Nelson's waste fraction removal process would operate, because there would be no continuous flow, i.e. sample would not flow past the closed valve. Thus, the proposed modification would render Nelson's enrichment method unsatisfactory for its intended purpose, thereby violating MPEP 2143.01 (V). Moreover, the proposed modification would change the principle of operation of Nelson's enrichment method, thereby violating MPEP 2143.01 (V).

According to MPEP 2143.01(IV), a statement that the claimed invention is within the capabilities of the artisan, without a rational underpinning, is not sufficient to establish *prima facie* obviousness. As noted above, the proposed rationale for combining Nelson with Unger is contrary to the direct teaching of Nelson, which requires the enrichment medium as an essential element. Moreover, the proposed rationale renders Nelson unsatisfactory for its intended purpose and changes its principle of operation. In sum, there is no evidence or suggestion in the cited references for such a modified configuration of Nelson, and hence a rational underpinning is absent.

Based on the above, Applicants submit a *prima facie* case of obviousness with regard to independent claim 67 is established. Presently pending claims 68, 69, 76, and 79 depend from claim 67, and are therefore allowable as depending from an allowable base claim, as well as for the nonobvious combination of elements they recite. Withdrawal of this rejection is respectfully requested.

Dependent Claim 76

According to presently pending claim 76, the lysing is performed by a lysing chemical introduced through a cross-flow injector structure, wherein the cross-flow injector structure comprises the intersection of a first microfluidic flow channel and a second microfluidic flow channel.

The Office Action states that Nelson does not teach the intersection of a first microfluidic flow channel and a second microfluidic flow channel. However, it is not explained how the combination with Unger remedies the deficiency. If this rejection is maintained, clarification is respectfully requested.

Dependent Claim 79

According to presently pending claim 79, lysing is performed in a rotary mixer of the microfluidic device. The Office Action states that Nelson does not teach a rotary mixer. However, it is not explained how the combination with Unger remedies the deficiency. If this rejection is maintained, clarification is respectfully requested.

Second 35 U.S.C. §103 Rejection

Claims 70-73, 75, 80, 83, 84, and 87 were rejected under 35 U.S.C. 103(a) as allegedly obvious over Nelson and Unger, in view of US 2003/0099928 A1 [“Burlage”]. This rejection is traversed.

Presently pending independent claims 70 and 73 are drawn to methods of obtaining nucleic acid from a sample. The methods have an isolating step that includes, among other things, allowing the individual biological element or the subset of the biological elements to flow past a first valve of the microfluidic device, creating a segment within the flow channel by actuating the first valve and a second valve of the microfluidic device, and preventing the individual biological element or the subset of the biological elements from exiting the segment past the first valve or the second valve.

As noted above, Nelson describes immobilization with an enrichment medium, but does not teach or suggest an isolation step that involves allowing a biological element to flow past a first valve, creating a segment by actuating the first valve and a second valve, and

preventing the biological element from exiting the segment past the first valve or the second valve. There is no reason supported by a rational underpinning for the artisan to combine Nelson with Unger to remedy these deficiencies.

At paragraph [0065], Burlage describes a cell separation step that requires probe labeling. However, Burlage does not teach or suggest an isolation step that involves allowing a biological element to flow past a first valve, creating a segment by actuating the first valve and a second valve, and preventing the biological element from exiting the segment past the first valve or the second valve. Hence, Burlage fails to remedy the deficiencies of Nelson.

Applicants submit that the Nelson, Unger, and Burlage references would not provide the artisan with a reason to combine elements in the way the presently claimed new invention does, and therefore claims 70 and 73 are nonobvious. Presently pending claims 71, 72, 75, 80, 83, 84, and 87 depend from independent claims 70 or 73, and are therefore patentable by virtue of their dependence from a patentable claim, as well as the nonobvious combination of elements they recite. Withdrawal of this rejection is respectfully requested.

Dependent Claim 84

According to presently pending claim 84, the lysing is performed by a lysing chemical introduced through a cross-flow injector structure, wherein the cross-flow injector structure comprises the intersection of a first microfluidic flow channel and a second microfluidic flow channel.

The Office Action states that Nelson does not teach the intersection of a first microfluidic flow channel and a second microfluidic flow channel. However, it is not explained how the combination with Unger and Burlage remedies the deficiency. If this rejection is maintained, clarification is respectfully requested.

Dependent Claim 87

According to presently pending claim 87, lysing is performed in a rotary mixer of the microfluidic device. The Office Action states that Nelson does not teach a rotary mixer. However, it is not explained how the combination with Unger and Burlage remedies the deficiency. If this rejection is maintained, clarification is respectfully requested.

Third 35 U.S.C. §103 Rejection

Claims 77 and 78 were rejected under 35 U.S.C. 103(a) as allegedly being obvious over Nelson in view of Unger. This rejection is traversed.

As noted above, presently pending independent claim 67 is drawn to a method of obtaining nucleic acid from a sample. The method has an isolating step that includes, among other things, allowing the individual biological element or the subset of the biological elements to flow past a first valve of the microfluidic device, creating a segment within the flow channel by actuating the first valve and a second valve of the microfluidic device, and preventing the individual biological element or the subset of the biological elements from exiting the segment past the first valve or the second valve.

Unger describes microfabricated elastomeric valve and pump systems. However, for the reasons stated above with regard to claim 67, Applicants submit there is no reason supported by a rational underpinning for the artisan to combine Nelson with Unger to arrive at the combination of elements recited in base claim 67.

Presently pending claims 77 and 78 depend from independent claim 67, and are therefore patentable by virtue of their dependence from a patentable claim, as well as the nonobvious combination of elements they recite. Withdrawal of this rejection is respectively requested.

Fourth 35 U.S.C. §103 Rejection

Claims 81, 82, 85, and 86 were rejected under 35 U.S.C. 103(a) as allegedly obvious over Nelson in view of Burlage and Unger. This rejection is traversed.

As noted above with regard to the Second 103 Rejection, presently pending independent claims 70 and 73 are nonobvious in view of Nelson, Burlage, and Unger.

Presently pending claims 81, 82, 85, and 86 depend from independent claims 70 or 73, and are therefore patentable by virtue of their dependence from a patentable claim, as well as the nonobvious combination of elements they recite. Withdrawal of this rejection is respectively requested.

Appl. No. 10/678,946
Amdt. dated November 12, 2008
Amendment under 37 CFR 1.116 Expedited Procedure
Examining Group 1637

PATENT

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,

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